CLAIMS

1. An excitation vector generating apparatus comprising:

pulse position determining means for determining a first pulse and a second pulse that are adjacent to each other; and

random code vector generating means for generating a first random code vector based on respective positions of the first pulse and the second pulse.

2. The excitation vector generating apparatus according to claim 1, wherein said pulse position determining means comprising:

first pulse position selecting means for selecting a position of the first pulse among predetermined pulse position candidates; and

second pulse position selecting means for selecting a position of the second pulse adjacent to the position of the first pulse using the position of the first pulse as a reference.

3. The excitation vector generating apparatus according to claim 2, further comprising:

control means for controlling the first pulse position selecting means or the second pulse selecting means so that the position of a pulse determined in the pulse position determining means is not out of a frame.

4. The excitation vector generating apparatus according to claim 1, further comprising:

a random codebook for storing a second random code vector including a plurality of pulses being not adjacent to each other,

wherein the random code vector generating means

5   generates a random code vector from the first random code vector and the second random code vector.

5.   The excitation vector generating apparatus according to claim 1, further comprising:

mode determining means for determining a speech

10   mode; and

pulse position candidate number controlling means for increasing or decreasing the number of the predetermined pulse position candidates corresponding to the determined speech mode.

15   6.   The excitation vector generating apparatus according to claim 5, further comprising:

average power calculating means for calculating a level of average power of an excitation signal when the determined speech mode is a noise mode,

20   wherein said pulse position candidate number controlling means increases or decreases the number of the predetermined pulse position candidates based on the average power.

7.   A speech coding apparatus comprising the

25   excitation vector generating apparatus according to claim 1.

8.   A speech coding apparatus comprising:

excitation vector generating means for generating a new excitation vector from an adaptive code vector output from an adaptive codebook storing an excitation vector and a random code vector output from a partial

5 algebraic codebook storing a random code vector obtained in the excitation vector generating apparatus according to claim 1;

excitation vector updating means for updating the excitation vector stored in the adaptive codebook to the

10 new excitation vector; and

speech synthesis signal generating means for generating a speech synthesis signal using the new excitation vector and a linear predictive analysis result in which an input signal is quantized.

15 9. A speech decoding apparatus comprising:

excitation parameter decoding means for decoding excitation parameters including position information on an adaptive code vector and index information to designate a random code vector;

20 excitation vector generating mean for generating an excitation vector using the adaptive code vector obtained from the position information on the adaptive code vector and the random code vector having at least two pulses adjacent to each other obtained from the index

25 information;

excitation vector updating means for updating the excitation vector stored in the adaptive codebook to the

generated excitation vector; and

speech synthesis signal generating means for generating a speech synthesis signal using the generated excitation vector and a decoded result of quantized linear predictive analysis result transmitted from a coding side.

10. A speech coding/decoding apparatus comprising:

a partial algebraic codebook for generating excitation vectors each comprised of three excitation pulses, and storing the excitation vectors;

limiting means for performing a limitation to generate an excitation vector in which an interval between at least a pair of the excitation pulses is relatively short among the excitation vectors; and

a random codebook used adaptively corresponding to a size of the partial algebraic codebook.

11. The speech coding/decoding apparatus according to claim 10, wherein the limiting means classifies a speech into a voiced speech and a non-voiced speech corresponding to a position of the excitation pulse.

12. The speech coding/decoding apparatus according to claim 9, wherein a rate of the random codebook is increased by a portion corresponding to a decreased size of the partial algebraic codebook.

13. The speech coding/decoding apparatus according to claim 10, wherein the random codebook is comprised of a plurality of channels, and positions of the excitation

pulses are limited so as to prevent the excitation pulses from overlapping between the channels.

14. A speech coding/decoding apparatus comprising:

an algebraic codebook for storing an excitation vector;

dispersion pattern generating means for generating a dispersion pattern corresponding to a power level of a noise interval in speech data; and

pattern dispersion means for dispersion a pattern of the excitation vector output from the algebraic codebook according to the dispersion pattern.

15. The speech coding/decoding apparatus according to claim 14, wherein the dispersion pattern generating means generates a dispersion pattern with strong noise characteristic when an average background noise power level is high, while generating a dispersion pattern with weak noise characteristic when the average background noise power level is low.

16. The speech coding/decoding apparatus according claim 14, wherein the dispersion pattern generating means generates the dispersion pattern corresponding to a mode of the speech data.

17. A base station apparatus comprising the speech coding apparatus according to claim 8.

18. A base station apparatus comprising the speech coding/decoding apparatus according to claim 10.

19. A communication terminal apparatus comprising the

speech coding apparatus according to claim 8.

20. A communication terminal apparatus comprising the speech coding/decoding apparatus according to claim 10.

21. An excitation vector generating method, comprising:

the first pulse position selecting step of selecting a first pulse position among predetermined pulse position candidates;

the second pulse position selecting step of selecting a second pulse position adjacent to the first pulse position using the first pulse position as a reference; and

the random code vector generating step of generating a random code vector based on the first pulse position and second pulse position.

22. The excitation vector generating method according to claim 20, wherein in the random code vector generating step, the random code vector is generated from a first random code vector and a second random code vector including a plurality of pulses being not adjacent to each other.

23. A speech decoding method, comprising:

the excitation parameter decoding step of decoding excitation parameters including position information on an adaptive code vector and index information to designate a random code vector;

the excitation vector generating step of

generating an excitation vector using the adaptive code vector obtained from the position information on the adaptive code vector and the random code vector having at least two pulses adjacent to each other obtained from

5   the index information;

the excitation vector updating step of updating the excitation vector stored in the adaptive codebook to the generated excitation vector; and

the speech synthesis signal generating step of

10   generating a speech synthesis signal using the generated excitation vector and a decoded result of quantized linear predictive analysis result transmitted from a coding side.

24.   A computer readable recording medium storing an

15   excitation vector generating program, wherein said excitation vector generating program including the procedures of:

selecting a first pulse position among predetermined pulse position candidates;

20   selecting a second pulse position adjacent to the first pulse position using the first pulse position as a reference; and

generating a random code vector based on the first pulse position and second pulse position.